SHRP2

Safety Programs of the Future
THE VISION

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American Association of State Highway and Transportation Officials
AASHTO
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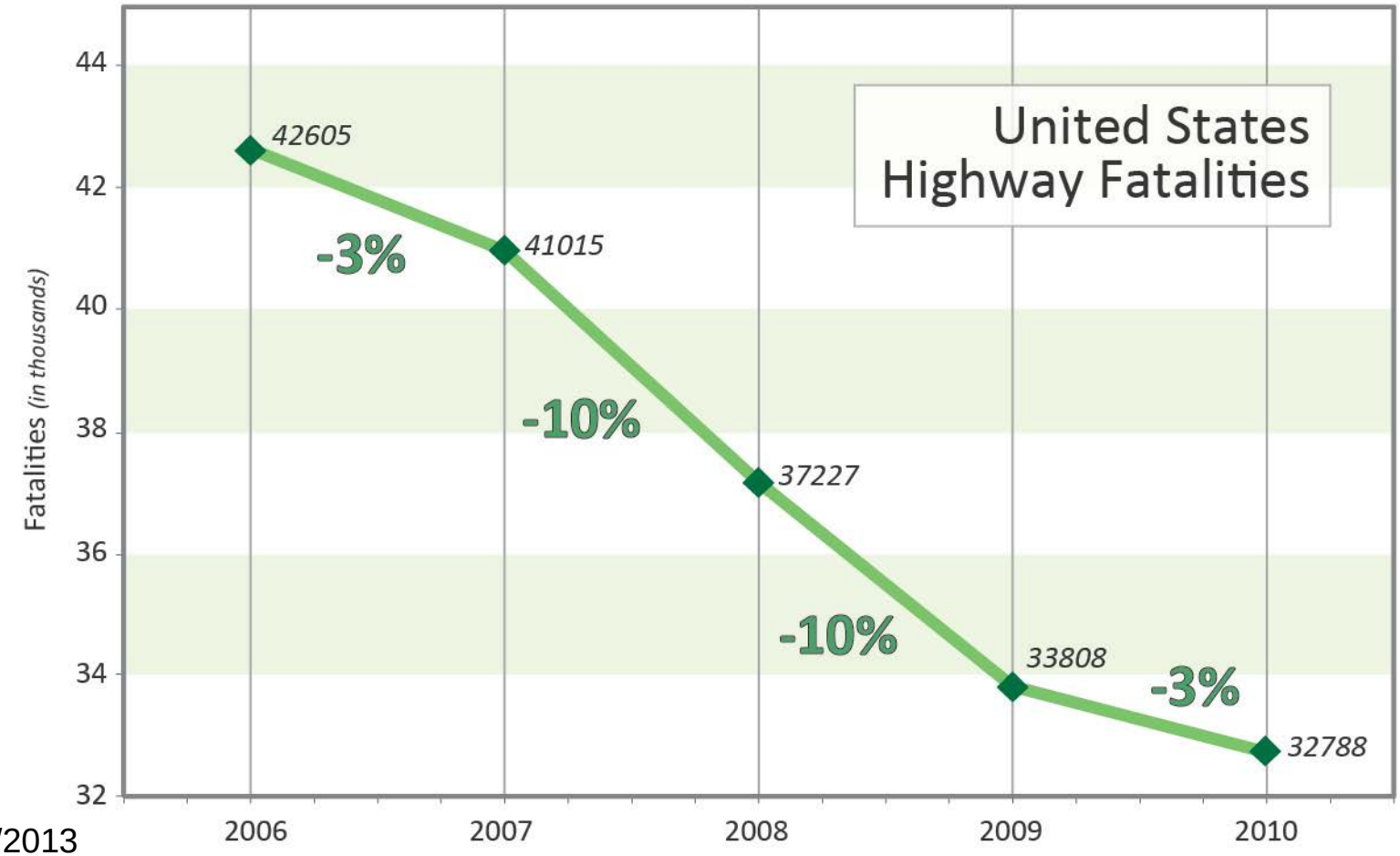
- The National Highway Safety Strategy
- Used the 1997 AASHTO strategic plan as a base
  - Broadened the outreach
  - More inclusive in ownership
  - Longer time horizon – at least 25 years
- Safety Culture strategies were included
- State Strategic Highway Safety Plans required

THE PAST
Highway Deaths



COUNTERMEASURES

to ZERO

AASHTO Plan

State Strategic Highway Safety Plans

Behavioral Countermeasures

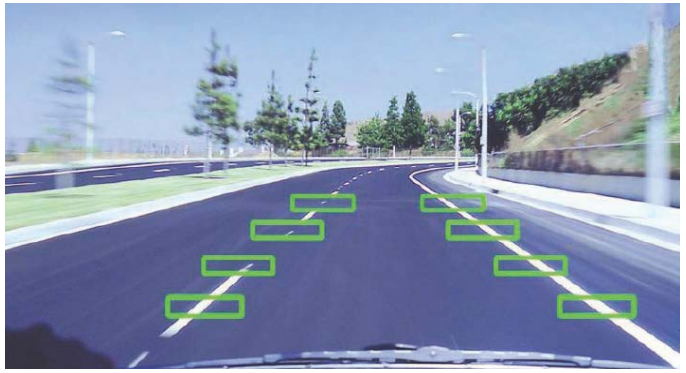
- Primary belt laws and laws for all seating positions, belt reminder systems
- Sobriety checkpoints/saturation patrols, ignition interlock for all convicted offenders
- High visibility enforcement and strategic communications
- Standardized, automated, and linked data systems
- Speed governor systems

Infrastructure Countermeasures

- Pervasive protection/ prevention for lane departures
- Intersection improvements
- Median cross-over prevention
- New design codes and new tools
- Road safety audits—RSAs
- New tools e.g. HSM and safety analyst

Vehicle Countermeasures

- Vehicle-to-Vehicle and Vehicle-to-Infrastructure communication
- Electronic stability control
- Other safety features:
  - Lane departure warnings
  - Adaptive headlights
  - Forward collision warning
  - Brake assist



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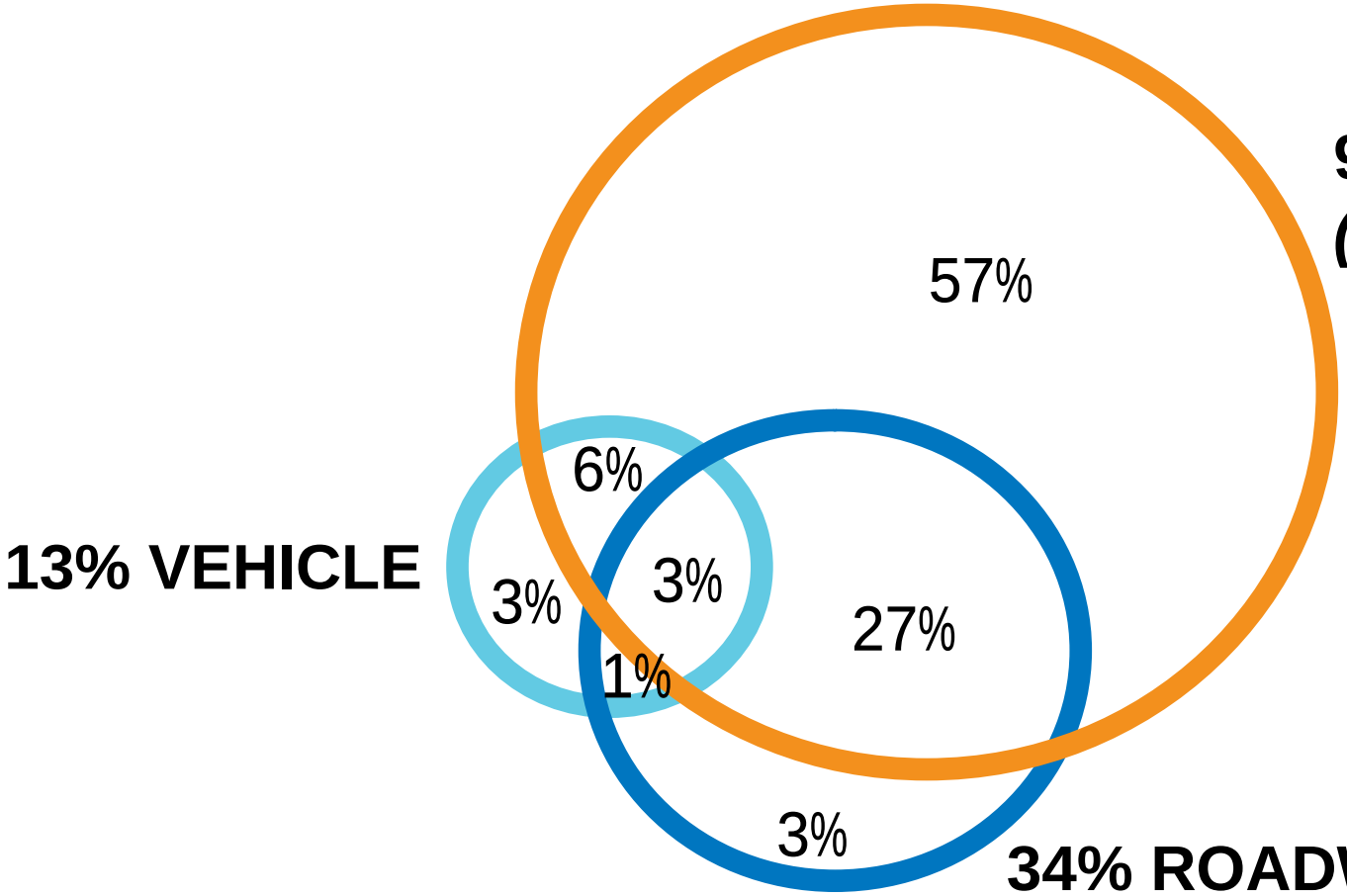
Future SHRP ------- SHRP2

Factors Contributing to Crashes



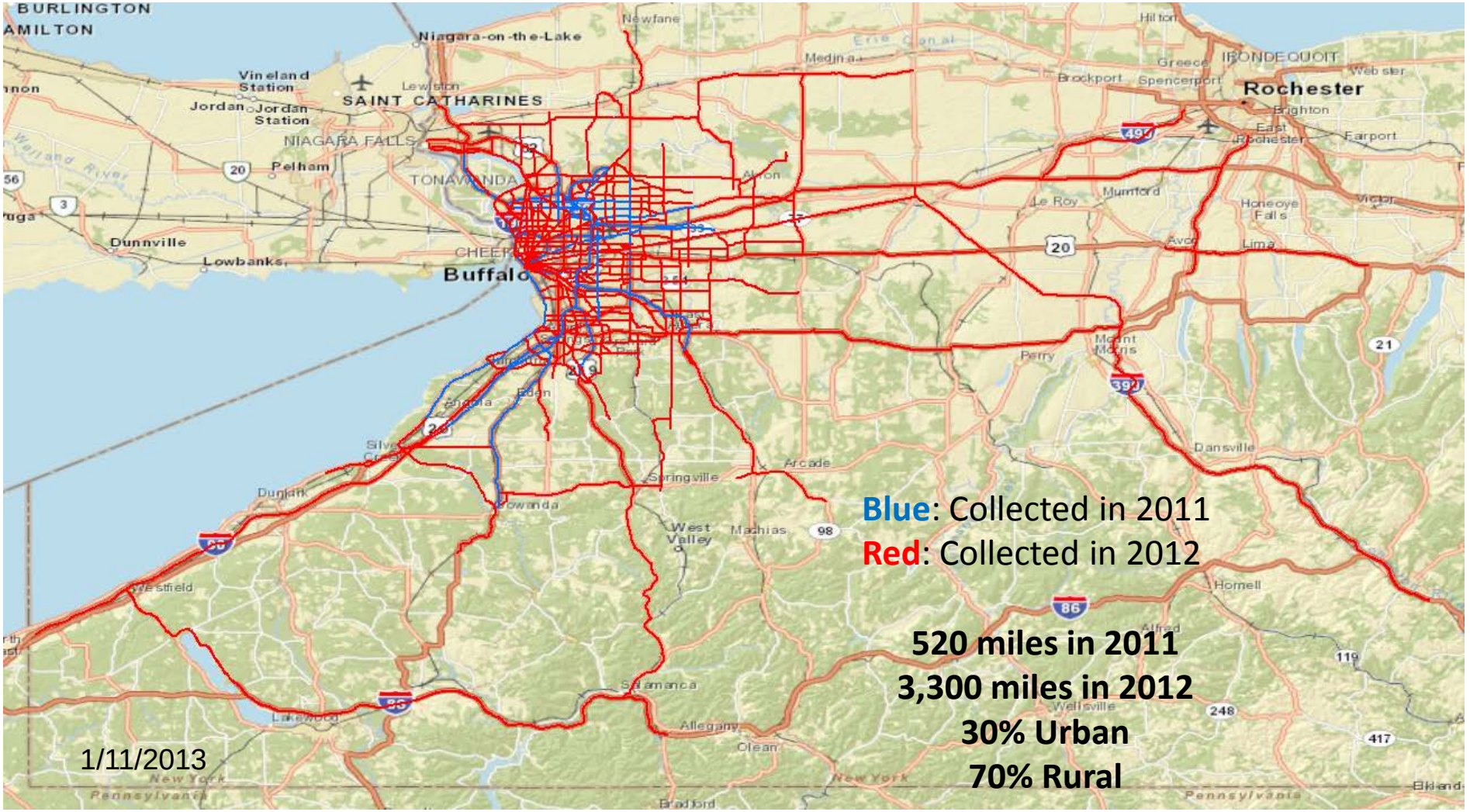
Source: Treat, 1979 as cited in AASHTO Highway Safety Manual

Driver Study

We "UPGRADED" ☺ Volunteer Vehicles

- As of November 19, 2012
  - 1,871 participants on the road, 671 completed participants, 242 remaining to recruit
  - 2,196 vehicle-years to date, 59% of 3,662 projected total; (current projected total is 94% of 3,900 goal)
  - 10.7M estimated vehicle miles to date
  - 177 known crashes (more in database not yet identified)
  - 9,306 centerline miles of roadway data collected; 75% of total;
    about 3,200 miles to collect in 2013

New York


Blue: Collected in 2011
Red: Collected in 2012
520 miles in 2011
3,300 miles in 2012
30% Urban
70% Rural
1/11/2013

Safety Program Goals

- Complete data collection by November 2013
- Complete the NDS and Roadway data files by March 2014
- Make the data broadly accessible – Development activities
  - Develop user-friendly subfiles and analysis tools
  - Produce public files of de-identified data
- Market the data
- Prepare for long-term stewardship of the data
- **USE THE DATA**

No number greater than zero is acceptable on nation's roadways

Our work as transportation professionals is not completed until we reach zero.

Zero® Fatalities

Drive Safe Nevada

SHRP2

Designing Effective Driver Assistance Systems – 'What was the Driver *Really* Doing?'

Richard K. Deering
SHRP2 Safety TCC

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The Science of Non-Events - studying what 'might' have occurred

- Crash Worthiness
  - the event definitely occurs (somebody crashes)
  - the driver is a passive element that is acted upon by the occupant protection system
  - the results are measurable
- Crash Avoidance
  - the 'event' (behavior) may or may not result in a crash
  - the driver is an active (and somewhat unpredictable) element in the vehicle control loop
  - interpreting behaviors and results is not straightforward

Understanding Driver Behavior and Crash Risk – an evolving science

Historical Approach - External Observations of Actual Crashes

אוניברסיטת בן-גוריון בנגב
Ben-Gurion University of the Negev

Summary of 4 post-hoc clinical studies of crash causation

	UK 1975	IU 1977	UDA 1999	NMVCCS 2008
Human	94	93	99	97
Environment	28	34	5	33
Vehicle	8	13	1	12
Total %	130	140	105	132

Source: Shinar (2012), Seventh SHRP2 Safety Symposium, Washington, DC

What is the Driver *Really* Doing??

Driver's Secondary Task Types observed in the 100-Car study

- Day Dreaming
- Dining
- External Distraction
- Internal Distraction
- Passenger-Related Tasks
- Personal Hygiene
- Smoking
- Talking / Singing: No Passenger Apparent
- Vehicle Related Task
- Wireless Device

Other…

Source: Neale, Dingus, Klauer, Sudweeks & Goodman (2005), An Overview of The 100-Car Naturalistic Driving Study and Findings, Enhanced Safety of Vehicles Conference, Paper Number 05-0400

Relating Driver Behavior to Crash Risk - association is *not* causation

- Just because the driver has been observed doing ‘something’ prior to a crash does not mean that act is a causal factor in the crash
- Some have noted that in nearly all motor vehicle crashes the driver can be observed to be breathing immediately prior to the event
  - Is breathing *associated* with crashes – yes…
  - Is breathing a *cause* of crashes – probably not…

Understanding Driver Behavior and Crash Risk – an evolving science

Naturalistic Approach – Internal Observations of 'Crashes and Near-Crashes'

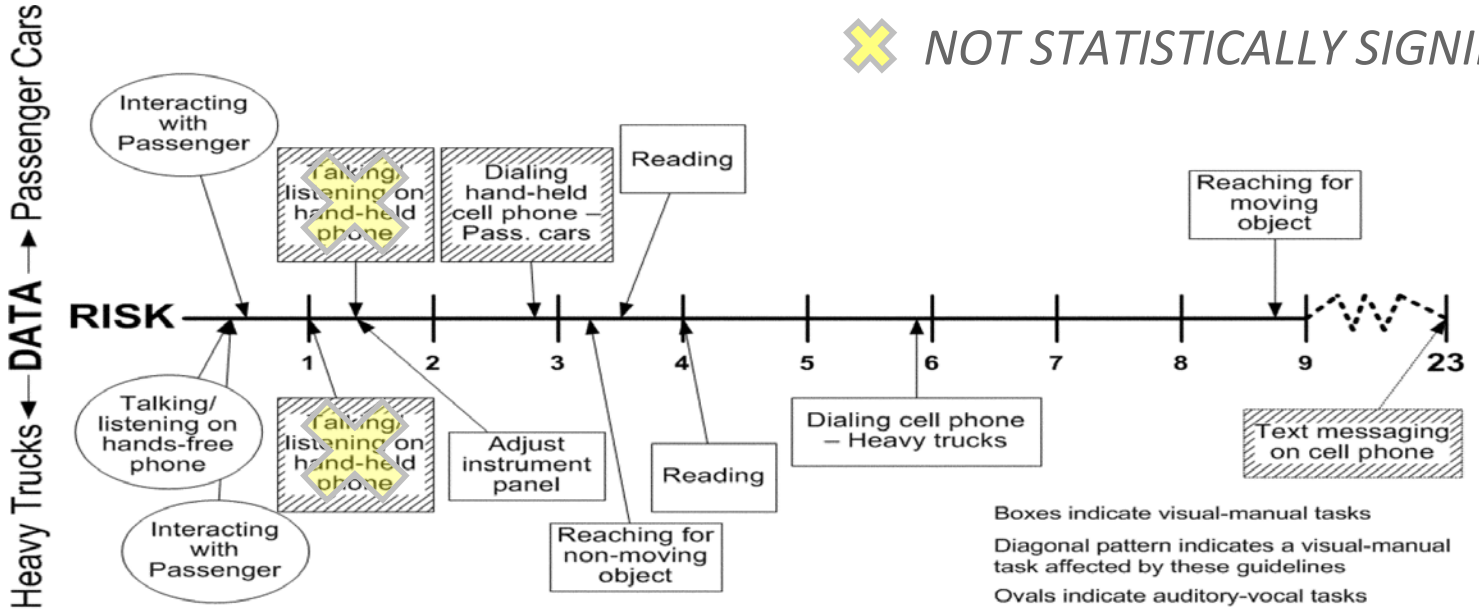

Figure 1: Risk Odds Ratios Determined by the Original 100-Car Study Analyses and Two Study FMCSA Analyses

Source: Visual Manual NHTSA Driver Distraction Guidelines for In-Vehicle Electronic Devices, Docket No. NHTSA-2012-053, Federal Register / Vol. 77, No. 37 / Friday, February 24, 2012, pg. 11205

What is a “Near Crash”?

“Near-crash – Any circumstance that requires a rapid, evasive maneuver by the subject vehicle, or any other vehicle, pedestrian, cyclist, or animal to avoid a crash. A rapid, evasive maneuver is defined as a steering, braking, accelerating, or any combination of control inputs that approaches the limits of the vehicle capabilities.”

Source: Dingus, et. al., The 100-Car Naturalistic Driving Study, Phase II – Results of the 100-Car Field Experiment, DOT HS 810 593, April 2006

Driver Assistance System Effectiveness - What happens in the real world?

- A recent study* of the insurance effects of Crash Avoidance technologies deployed in the real world suggest observable benefits for
  - Forward Collision Avoidance Systems and
  - Adaptive Headlights
- While “Lane Departure Systems have yet to demonstrate benefits”
- Once again, these are only external observations of results. We need more detailed naturalistic information to understand what is really happening in the vehicle.

* Source: IIHS Status Report Vol.47, No. 5, July 3, 2012, Special Issue: Crash Avoidance

Applying SHRP2 NDS Data to Resolve Real World Issues

Pilot Analyses of the SHRP2 NDS Data are underway:

- Inattention-Risk Function for Lead Vehicle Crashes (SAFER @ Chalmers)
- Evaluation of Offset Left-Turn Lanes (MRI Global)
- Car-Following Behavior, Driver Distraction and Capacity-Reducing Crashes on Congested Freeways (CTS @ UMinn)
- Relationship between Driver Behavior and Safety on Curves (CTRE @Iowa State)





SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Tony Furst

FHWA Associate Administrator for Safety

The benefits of SHRP2 Safety Research

Discussion

U.S. Department of Transportation
Federal Highway Administration

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THE BENEFITS

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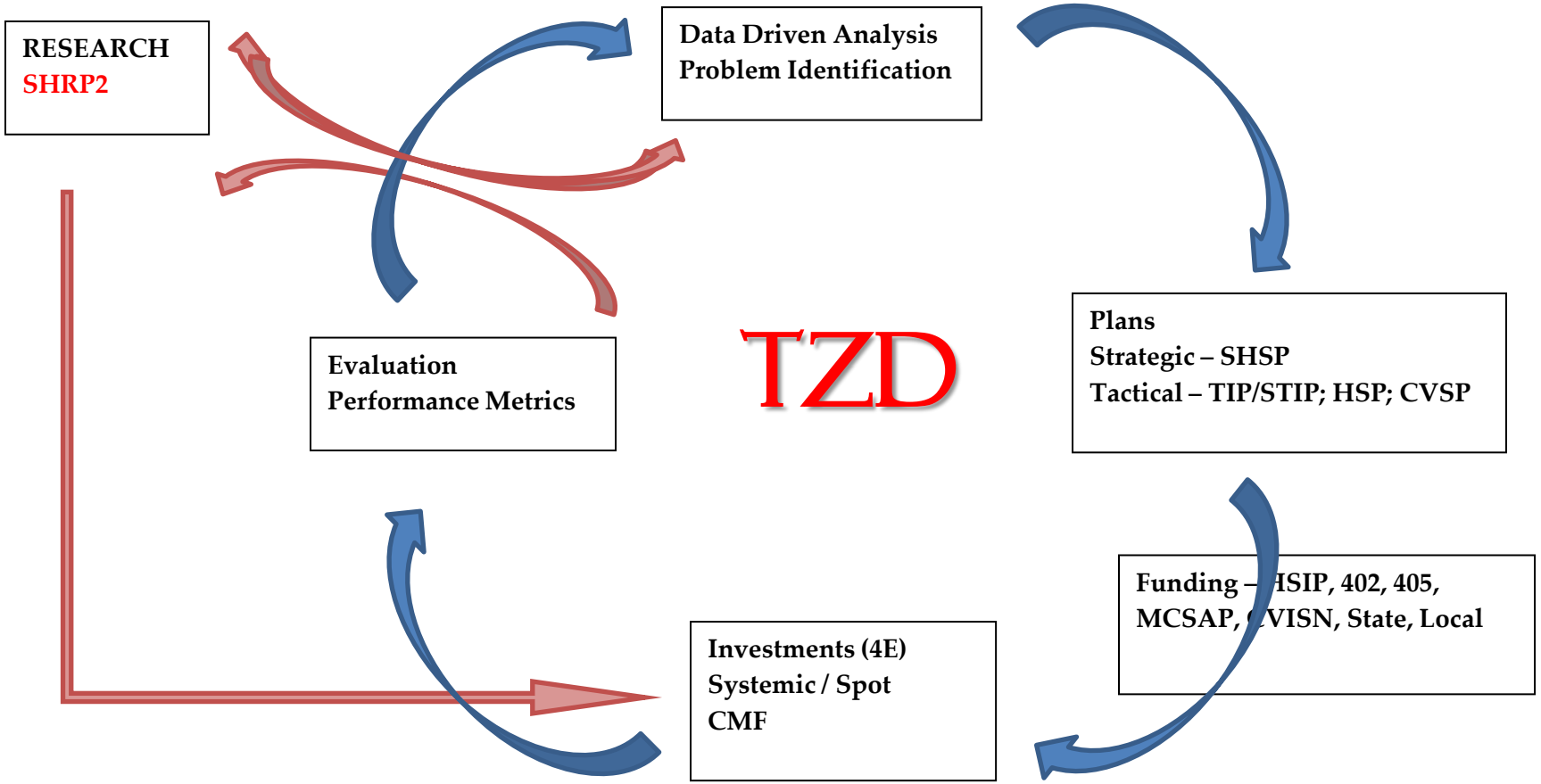
SHRP2 – Safety



SHRP2 – Safety

- We've done remarkably well with what we have.
- The databases link driver behavior and performance to the physical environment (road design details, roadside hardware, automated enforcement) and transient elements (weather, work zones)
- Enables a whole new field of study that was not available before.

SHRP2 – Safety

- The list of potential research pursuits are as open as your imagination.
- The objective, as it's always been, is saving lives.
- How can we mine this data to develop new countermeasures or make changes to design guides and associated practices?

SHRP2 – Safety

- Trip File Headers
- Reduced Datasets
- Consent Agreements
- Secure Enclaves

SHRP2 – Safety

RESEARCH
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Problem Identification

Behavioral Countermeasures

Vehicle Countermeasures

Infrastructure Countermeasures

Potential changes to:

- AASHTO Green Book
- Roadside Design Guide
- Highway Safety Manual